PATENT SPECIFICATION (11) 1 532 495

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(21) Application No. 6849/76 (22) Filed 20 Feb. 1976
(23) Complete Specification filed 18 Feb. 1977
(44) Complete Specification published 15 Nov. 1978
(51) INT CL² B61F 5/30
(52) Index at acceptance B7L 15A 15C3 15CX3

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(19)

(54) RAILWAY WAGON SUSPENSION UNIT

(71) We, BRITISH STEEL CORPORATION, a Corporation incorporated and existing under the Iron and Steel Act 1967 whose principal office is at 33 Grosvenor Place, London S.W.1 do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to railway wagon suspension units; such units may be used separately in conjunction with each wheel of a single axle two-wheel assembly, commonly called a pedestal unit, or embodied in side frames in a composite bogie structure, e.g. a four-wheel two-axle or six-wheel three-axle bogie.

The present invention provides a railway wagon suspension unit comprising a frame mounted over a saddle accommodating an axle journal housing, suspension means disposed between the frame and the saddle including load springs for vertical support, and a friction block mounted on the saddle and firmly biassed into direct or indirect contact with the axle journal housing to provide substantially constant frictional forces against lateral motion between the saddle and the housing.

Preferably the friction block is in the form of a wedge biassed into direct or indirect contact with bearing surfaces on both the saddle and the axle journal housing. Two blocks may be provided, one on each side of the housing. A vertical damper may be provided in parallel with the load springs, and the suspension means may also include a link (traction) rod or rods mounted between the frame and the saddle for stabilising the saddle against longitudinal forces generated in service and operable to transfer traction forces between the saddle and the frame and control axle movement in curves.

The provision of the constant friction block(s) in accordance with this invention ensures that lateral restraints imposed on wheel set oscillations during service are not load sensitive as has been the case with some wedge-pot dampers and other suspensions hitherto. The wear pattern on the wear plates is consequently determined only by the lateral movements and not both lateral and vertical motion. The incidence of jamming or sudden off-loading of the frame occasioned by the spring energy being constrained, or suddenly released, as a result of badly worn plates and wedge faces is therefore mitigated since the springs are relieved of any duties on friction damping.

In order that the invention may be fully understood, one embodiment thereof will now be described, by way of example, with reference to the accompanying drawings in which:—

Figure 1 is a part sectional side elevation of a suspension unit according to this invention;

Figure 2 is a section along II—II in Figure 1; and

Figure 3 is a part sectional and elevation of Figure 1.

Referring now to the drawings a frame 1 is mounted over a saddle 2 which accommodates a journal housing 3 of an axle 4 on which is mounted a wheel 5. Two traction rods 6 extend inwardly from extremities of the frame to the saddle 2, the rods extending substantially horizontally and incorporating spherical rubber bearing bushes 7 (Fig. 2) at their inner ends at which they are anchored by studs 8 and, at their outer ends, control rubbers 9 bonded to a cage 10 through which a Tee-shaped bar 11 extends. Control fingers 12 depend from the frame into slots 13 formed on the fore and aft platforms of the saddle to limit lateral movement between the frame and the saddle, and hence limit the lateral shear on the springs.

Springs sets 14 extend between the fore and aft platforms and aligned seatings 15 in the frame.

In particular each spring set comprises a coil spring 16 and mounted within it a series of bonded metal/rubber hollow discs 17 through the centre of which extends a hollow stabilising pillar 17A. The discs are

surmounted by a cup 18 accommodating a hollowed rubber plug 19 which bears on the seating 15 via a disc 20. This spring set assembly provides variable rate springing with the plug 19 promoting a smooth transition between the rate of the coil spring and the composite spring rate.

The journal housing 3 incorporates an outer machined structure 21 having an elongated rib 22, convex in cross-section, secured to its upper surface. An inversely curved elongated channel member 23 mounted on the underside of the saddle aperture engages the rib, the saddle thus being borne on the structure 21 through this 'rocker' assembly.

Welded or otherwise secured to opposite sides of the structure 21 are two 'friction' wear plates 24 which co-operate with associated constant friction blocks. More particularly, these blocks each comprise a cast steel wedge 25 permanently biassed by a preset (i.e. exhibiting a predetermined constant force) spring unit 26 against the saddle structure itself on the one side and the axle journal housing on the other. Contact with the housing is effected via an intermediate member 27 which bears on the wear plate 24, this member, which is circular in cross-section, being housed within a bush 28 in the saddle wall. Contact with the saddle is effect via an elongated channelled member 29 which extends through aligned slots 30 in the saddle casting, being retained therein by lips 31 on the channel extremities; wear plates may be secured to this channelled member on which the wedge bears.

Retention bolts 32 extend through slots 33 in the saddle ensuring retention of the saddle within the frame should the latter be lifted.

Finally, a hydraulic damper 34 is mounted between the frame structure and the journal housing 3, that is, effectively in parallel with the load springs, so as to provide a degree of damping for the latter in the vertical sense. This facility overcomes problems associated with wheel loading suddenly being relieved in service by frictional forces, this being particularly significant should it occur over wheel weighing devices, which are now extensively used in the track, since false readings may otherwise be registered.

In operation, when the unit is in service the saddle principally effects vertical, longitudinal and lateral motion relative to the frame, the latter motion being manifested by the saddle 'rocking' about the rib/channel assembly — any tendency to rotational motion about the vertical axis is restrained by this assembly. The vertical motion is accommodated and damped primarily by the load springs, the longitudinal motion effected during driving and braking is accommodated and damped by the traction rods, relieving the load springs of shear forces which would otherwise be produced, and the lateral motion is restrained by the frictional forces between the wedge 25 and the members on which it bears, namely channel member 29 (directly)and wear plate 24 (indirectly).

The wedge provides a constant frictional force of predetermined intensity whatever the conditions of service, being governed only by the preset spring unit 26 — which is resilient simply to accommodate wear — and the wear pattern on the plates 24 is constrained to extend solely laterally.

Although the invention has been described with reference to the specific embodiment mentioned above, it is to be understood that various modifications may be made without departing from the scope of this invention. For example spring assemblies other than the built-up form illustrated at 17 may be used, e.g. a monolithic bonded metal/rubber unit. Other forms of wedge biassing may be used and indeed an alternative design by which a friction block bears directly on the axle journal housing could be utilised if there was sufficient room to accommodate such a structure in-line between the housing and the main spring set. The friction blocks may readily be made from bar instead of being cast as described.

The provision of two traction rods is also not essential; a single rod could be used, and other forms of bushing may be adopted at the rod ends.

WHAT WE CLAIM IS:—

1. A railway wagon suspension unit comprising a frame mounted over a saddle accommodating an axle journal housing, suspension means disposed between the frame and the saddle including load springs for vertical support, and a friction block mounted on the saddle and firmly biassed into direct or indirect contact with the axle journal housing to provide substantially constant frictional forces against lateral motion between the saddle and the housing.

2. A suspension unit according to claim 1, wherein the block is in the form of a wedge biassed to a preset degree into direct or indirect contact with bearing surfaces on both the saddle and the axle journal housing.

3. A suspension unit according to claim 1 or claim 2, comprising two of said blocks, one on each side of the housing.

4. A suspension unit according to claim 2 or claim 3, wherein the block is biassed against the axle journal housing via an intermediate member mounted in and extending through a wall of the saddle.

5. A suspension unit according to any one

of claims 1 to 4, wherein a stabilising traction rod is mounted substantially horizontally between the frame and the saddle.

6. A suspension unit according to claim 5, comprising two if said traction rods, one on each side of the journal housing.

7. A suspension unit according to any one of claims 1 to 6, wherein the load springs extend between fore and aft platforms on the saddle and aligned seatings in the frame, and each comprise a coil spring having disposed within it a series of bonded metal/rubber hollow discs, surmounted by a resilient plug which bears on the frame seating, each assembly providing variable rate springing with the plug providing a smooth transition between the rate of the coil spring and the rate of the composite coil spring-metal/rubber discs.

8. A suspension unit according to any one of claims 1 to 7, comprising a vertical damper between the frame and the journal housing in parallel with the load springs.

9. A suspension unit according to any one of claims 1 to 8, wherein the saddle bears on the journal housing through mutually engaging surfaces each of curved cross-section, one being in the form of a channel and the other being in the form of a rib of smaller radius of curvature which nestles in the channel whereby to permit lateral rocking motion of the saddle and housing relative to one another.

10. A railway wagon suspension unit substantially as herein described with reference to the accompanying drawings.

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Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1978.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

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3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

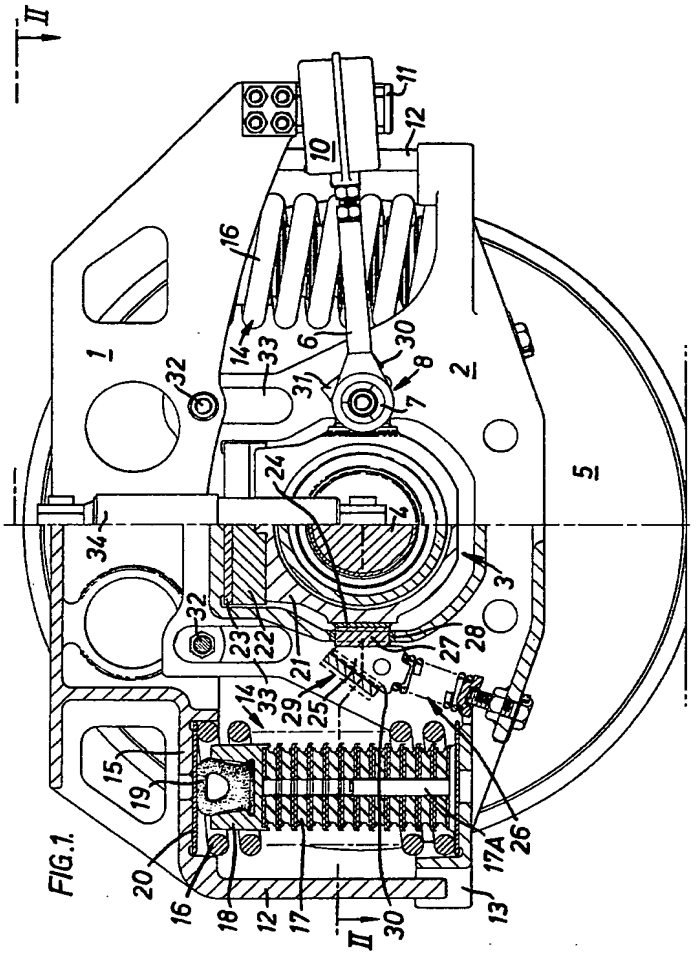

FIG.1.

1532495 COMPLETE SPECIFICATION
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Sheet 2

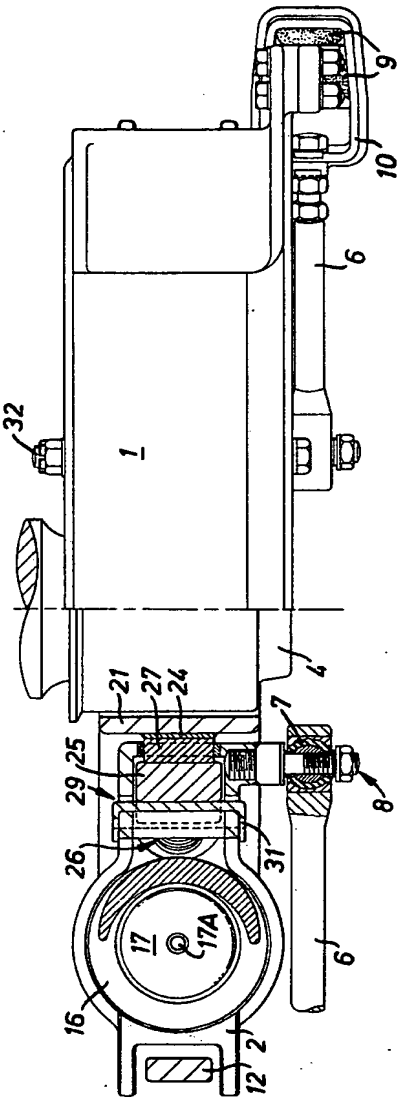

FIG.2.

1532495 COMPLETE SPECIFICATION
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Sheet 3

FIG.3.